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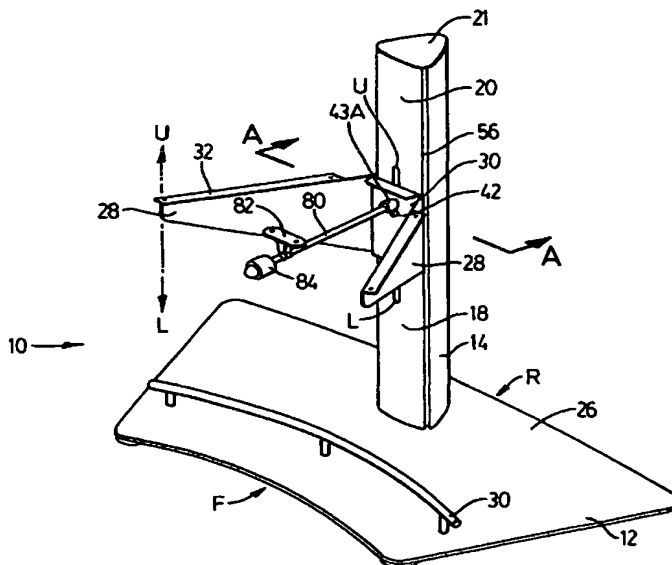
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(54) Title: HEIGHT ADJUSTABLE DESK



(57) Abstract: A desk assembly (10) comprises a base (12) adapted to stably engage a floor surface. An upright support member (14) is secured to and extends upwardly from the base. A planar desk (34) is connected in slidable engagement to the support member (14) between a lower (L) and an upper position (U). Biasing means, preferably a gas spring (100), is connected between the base (12) and the desk (34). The biasing means biases the desk upwardly from said lower position (L) toward said upper position (U). Locking means is operable to selectively secure said desk intermediate said lower and upper positions. The provision of an upwardly biased force by biasing means, between the upper and lower positions, improves convenience for the user when adjusting height of the desk.

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**HEIGHT ADJUSTABLE DESK****BACKGROUND OF THE INVENTION**

This invention relates to a height adjustable desk and more particularly to a height  
5 adjustable desk which utilizes an upwardly biased force to provide lift to the desk.

It is known to provide desks or work stations which allow the user to adjust the  
height thereof. This height adjustment allows for differences in the heights of the users  
or to adjust the height of the work surface depending on the task at hand. Height  
adjustment of desks and work stations is achieved in various manners. Often, to adjust  
10 the height of the desk, significant time and effort is involved. For example, rudimentary  
systems involve manually adjusting the length of each of the legs of the desk. Other  
height adjustment systems have the desk attached to a base support via a telescoping  
support member or members which may be secured at various vertical positions. Such  
systems require the user to manually expand or retract the telescoping support member  
15 and then fix it in place at the desired height. The weight of the desk and/or the weight of  
the items positioned on the surface thereof make this height adjustment somewhat  
cumbersome as it may be difficult to simultaneously lock the desk in place and resist the  
gravitational forces acting on the desk. Certain other height adjustment mechanisms are  
complex and expensive to manufacture. It is desirable to provide an improved, more  
20 efficient and inexpensive height adjustable desk.

### SUMMARY OF THE INVENTION:

It is an object of the invention to provide an improved height adjustable desk.

In accordance with an aspect of the invention there is provided a desk assembly  
5 comprising a base adapted to stably engage a floor surface. An upright support member  
is secured to and extends upwardly from the base. A planar desk is connected in slidable  
engagement to the support member between a lower and an upper position. Biasing  
means is connected between the base and the desk. The biasing means biases the desk  
upwardly from said lower position toward said upper position. Locking means is operable  
10 to selectively secure said desk intermediate said lower and upper positions. The provision  
of the upwardly biased force, preferably in the form of a gas spring between the upper  
and lower positions, improves convenience for the user when adjusting height of the desk.

### BRIEF DESCRIPTION OF THE DRAWINGS:

15 Embodiments of the invention will now be described, by way of example, with  
reference to the accompanying drawings throughout which like reference numerals are  
used to refer to similar elements and features, in which:

FIG. 1 is a lower perspective view of an embodiment of the desk assembly in accordance  
with the invention;

20 FIG. 2 is an upper perspective view of an embodiment of the desk assembly in  
accordance with the invention;

FIG. 3 is a perspective view of a portion of the desk assembly in accordance with the invention;

FIG.4 is an exploded view of the desk assembly of FIG.3;

FIG.5 is a sectional view taken along line A-A of FIG.3;

5 FIG. 6 is a perspective view of a plurality of desk assemblies in accordance with the invention, positioned adjacent each other;

FIG. 7A is a top view of a plurality of desk assemblies positioned in a first group position; and

10 FIG. 7B is a top view of a plurality of desk assemblies positioned in a second independent work position.

#### DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS:

Shown in Figures 1 to 5 is an embodiment of the desk assembly in accordance with the invention. The desk assembly 10 has a front F and a rear R.

15

A base 12 is preferably an approximately isosceles trapezoidal shape with a concavely curved inner side, and may be comprised of steel and is adapted to stably engage a floor surface. An upright support member, preferably an extruded aluminum column 14 defining a hollow interior space 16, and having a vertical wall 18 is secured to  
20 the base and extends upwardly there from. The wall has inner 20 and outer 22 vertical

surfaces. The column may include a removable cap 21 which may be press fitted into engagement with the top of the column.

Preferably the column 14 is secured to the base by means of screws (not shown) extending through the base and into screw bosses 24 in the column 14 and the column 14 is positioned adjacent a rear edge portion 26 of the base.

Support means, preferably forwardly and diagonally extending brackets 28, secured to a carrier plate 30 are connected in slidable engagement along the column 14 between lower L and upper U positions. Preferably the brackets have upper planar outwardly extending horizontal flanges 32 upon which planar desk top 34 may be attached. The desk has a rearwardly positioned groove 33 in which the column 14 may be positioned. Although, it is preferred that a planar desk 34 is supported by the brackets 28, it should be understood that any suitable work piece may be supported by the brackets.

In the preferred form, the range of movement of the desk top permitted by movement of the support means between L and U includes or at least corresponds to positions of the desk top 34 employed by users of normal height when in seated and in standing positions, respectively.

A sliding channel piece 36 defines a vertical channel 38, having a lower end closed by an end piece 36a, is positioned along the inner vertical surface 20, and secured to the carrier plate 30 by a connector screw 42. Preferably, the sliding channel piece is guided  
5 along said inner vertical surface 20 by means of guide ribs 41 formed integrally with the inner vertical surface 20 of the extruded column 14. The connector screw 42 connects the carrier plate 30 and channel piece 36 so that the two move vertically in unison between the upper U and lower L positions. The connector screw extends rearwardly through a hole 44 in said carrier plate, through a vertically extending slot 46 machined in the  
10 column vertical wall 18 and in threaded engagement with nut 48 welded to the inner face of the channel piece in alignment with hole 44 formed through the channel piece 36. Vertical travel is limited at the lower position L by the connector screw 42 contacting the bottom of the slot 46 and at the upper position U by locking screw 43 contacting the top of the slot 46.

15

Preferably a wheel assembly 50 is rotatably mounted on each side of the carrier plate 30. Each wheel assembly 50 is secured to the carrier plate 30 by means of an axle assembly 52 which extends through rearwardly extending side portions 54 of the carrier plate on each side of the carrier thereof. Each portion 54 extends within a forwardly  
20 opening vertically extending channel 56 formed integrally with the vertical wall 18 of the

extruded column 14. Preferably the brackets 28 are secured to the side portions 54 on each side of carrier plate 30 and the portions 54 and brackets as well as channels 56 extend at an acute angle with respect to one another and with respect to a vertical plane of symmetry 55. Each wheel assembly 50 comprises a pair of wheel members 60 rotatably engaged on said axle assembly 52. The wheels are normally in rolling engagement with the column wall outer surface within channel 56.

A locking device is provided, preferably in the form of a clamp operable from adjacent the desk top 34, to selectively secure the support means in positions intermediate said upper U and lower L positions. Preferably locking screw 43 extends through the carrier plate 30 and sliding channel piece 36 via screw bosses formed therein, and is threadably engaged within a tapped hole 70A in a clamp plate 70 which is positioned adjacent said sliding channel piece 36 rearward of said channel piece within the column. Preferably, the clamp plate 70 comprises a main portion 70B extending transversely of the plane 55 and two outwardly rearwardly including wing portions 70C each engaging and extending parallel to the inner surfaces 20 of the portions of the bases of the forwardly opening vertically extending channels 56. The locking screw 43 has an enlarged head 43a abutting the front face of the carrier plate 30 which prevents the screw from advancing through the carrier plate. The locking screw may be rotated to threadably engage the clamp plate 70. With the head 43a flush with the carrier plate 30, threadably engaging the

clamp plate 70 with the locking screw head 43a deforms the carrier plate 30 resiliently into engagement with the vertical wall outer surface 22 and the resulting tension in the screw 43 presses the wings 70C of the clamp plate 70 tightly against the inner side of the bases of the channels 56. In this condition, the frictional engagement of plates 30 and 70  
5 with the column 14 locks the support means 28 and 30 in a selected position in the range of movement between the upper U and lower L positions.

A rotatable locking rod 80 is supported by bracket 82, secured to and extending from the underside of said desk top 34 and has a forwardly positioned locking knob 84 for  
10 rotation of said rod about its axis. The locking rod 80 is fixed to, for example with a set screw (not shown) passing radially through the head 43a, the head 43a so that rotation of the locking knob 84 rotates the locking screw and thus allows locking of the support means by threading the locking screw 43 into the clamp plate 70 as described above by  
rotation of the knob 84 in one sense or release of the clamp plate 70 and carrier plate 30  
15 by rotation of the knob in an opposite sense. It should be understood that any suitable locking device may be utilized to lock the desk in positions intermediate the upper U and lower L positions. For example, other clamping devices, could be used to selectively secure the brackets, the carrier plate or the channel piece to the column. While the above arrangement provides infinite adjustment within the permitted range, it is contemplated  
20 that the support means could be secured to the column 14 by locking pins, dowels or the



like that allow the support means to be fixed to the column at a number of discrete positions in the range.

Upwardly biasing means (which is preferably a gas spring) 100 is positioned  
5 between and connected between the base and the desk, for providing upward force  
sufficient to lift said support means and desk from the lower L to upper U positions  
without application of upward force by the user. In particular, the biasing means, gas  
spring 100, is preferably positioned within the column 14 below the sliding channel piece  
36 and biases the latter upwardly. Preferably biasing means, gas spring 100, includes an  
10 axially extending pin at each end. The lower pin is seated in an opening 112 in the base  
12. At the upper end, the pin 100A is received in an opening 36b in the end piece 36a.  
Preferably the gas spring comprises a single-acting non lockable piston, that simply  
compresses the gas in the cylinder on pressing the desk top 34 down on movement from  
U to L, the reaction against the piston providing the upward force that lifts the desk top  
15 34 unassisted from L to U. The gas spring may be for example a Suspa (TM) gas spring,  
such as the Suspa 41090 available from Suspa Incorporated of Grand Rapids, Michigan,  
U.S.A. It should be understood that the upward biasing force could be provided by other  
means such as a compression spring or the like positioned in a same manner or similar to  
the gas spring 100 shown in the drawings.

In an alternate embodiment of the invention, the brackets 28 may be integrally formed with the carrier plate 30.

A monitor support bracket 122 may be mounted to the extruded column 14 or desk 34 for holding a computer monitor 400. A vertical partition member 124 may be secured to the extruded column 14, positioned rearwardly of the column to provide a sound and sight barrier for the desk. A rail 300 acting as a foot rest for the user may be secured to the base 12

Shown in Figures 6 and 7 are a plurality of desk assemblies 10 positioned adjacent each other. The desk assemblies of Figures 6 and 7 include rectangular shaped desk tops 34 and bases 12. The desk tops 34 are slightly larger than the bases 12. The side edges 15 of adjacent desk tops 34 are aligned with each other. The use of a centrally located support member 14, as opposed to peripherally positioned leg members of the prior art, allows the positioning of work space equipment and accessories between the desk and bases and thus the positioning adjacent to each other of a number of desk assemblies, without taking up any additional space. Such equipment, for example computer processing units (CPUs) 144 or filing cabinets 146 may be secured in place by vertical support bars 148 which are secured to the desk tops 34 and extend downwardly toward the base 12. Brackets 150 insertable over the support bar 148, secure the equipment in

place between the desk and base. Brackets 150 are rotatably mounted on the support bar 148, allowing the equipment secured to the brackets to be rotated from a first position (shown in Figure 6) in the direction N to an inwardly nested position.

5        The desk assemblies 10, such as those shown in Figure 6 may be easily moved and repositioned without having to disconnect and separately move work space equipment such as CPUs 144 or filing cabinets 146. Such easily movable desk assemblies 10 are highly desirable in today's office environment for various reasons. For example, there is a growing awareness that projects which involve team work, require not just work  
10    stations and desks, but common areas and desk orientation which facilitates interaction and teamwork. Boardrooms offer such space, however because workers must relocate from their usual work space, there is a loss of efficiency and spontaneity. Furthermore, there are additional costs to keep a separate boardroom available for team projects. The space shown in Figures 7A and 7B illustrates how desk assemblies 10 in accordance with  
15    the invention, and particularly those in Figure 6, could be used to form a work space which may be adapted quickly from a position where the desks may be used for independent work (shown in Figure 7B) to a position which facilitates group/team work (shown in Figure 7A).

In light of the desirability of the desk to be moveable, it should be understood that any known suitable means may be utilized to allow the desk assembly to move along a floor surface. Such means may comprise smooth slider members 166 positioned on the lower surface of the base as shown in the drawings, or other means such as wheels or the like.

As will be apparent to those skilled in the art in the light of the foregoing disclosure, many alterations and modifications are possible in the practice of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

## CLAIMS:

1. A desk assembly comprising:  
a base adapted to stably engage a floor surface;  
an upright support member secured to and extending upwardly from said base;  
a planar desk, connected in slidable engagement to said support member between a lower and an upper position;  
biasing means connected between said base and said desk and biasing the desk upwardly from said lower position toward said upper position; and  
locking means operable to selectively secure said desk intermediate said lower and upper positions.
2. A desk assembly as recited in claim 1 wherein said desk is connected to said support member by support means.
3. A desk assembly as recited in claim 1 where said biasing means is a gas spring.
4. A desk assembly as recited in claim 3 wherein said gas spring comprises a single acting piston acting in a cylinder of compressed gas.
5. A desk assembly as recited in claim 1 wherein said support member is an extruded

column including a vertical wall, the wall having inner and outer vertical surfaces.

6. A desk assembly as recited in claim 3 wherein said support means comprises:  
forwardly laterally extending brackets, each bracket having an upper planar surface for supporting said desk;  
a carrier plate secured to said brackets, said carrier plate positioned on said outer vertical surface of the column in sliding engagement therewith;  
a sliding channel piece positioned along said inner vertical surface, secured to said carrier plate by a connector screw, said connector screw extending through a vertically extending slot in said column, the slot extending between said upper and lower positions, the sliding channel piece secured in sliding engagement, moving in unison with the carrier plate between said upper and lower positions along said slot, said gas spring positioned below the sliding channel piece engaging an end piece of said channel piece.

7. A desk assembly as recited in claim 6 wherein said brackets incline forwardly outwardly with respect to a median plane of the assembly.

8. A desk assembly as recited in claim 6 wherein the locking means comprises a clamp, operable to releasably secure said support means to said support member.

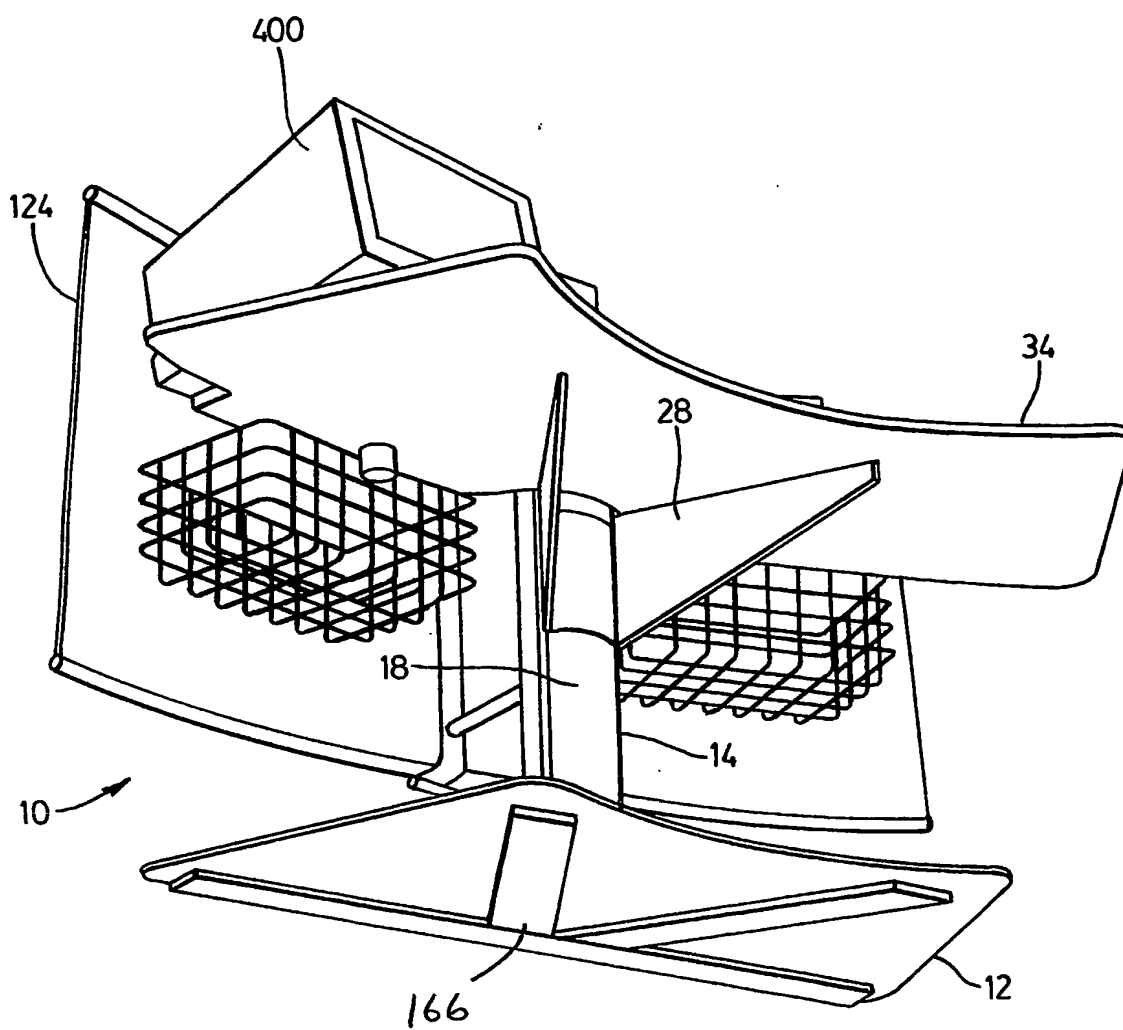
9. A desk assembly as recited in claim 8 wherein said clamp comprises a locking screw having a screw head abutting a front face of the carrier plate, the locking screw extending through said carrier plate, said slot and said channel piece and is threadably engaged with a clamp plate, said clamp plate positioned adjacent said vertical wall inner surface, such that selectively threadably engaging said clamp plate engages said clamp plate in frictional engagement in a clamped position with the vertical wall to retain the channel piece and carrier plate in a fixed position between said upper and lower positions.
10. A desk assembly as recited in claim 9 wherein the locking means further comprises a locking rod, having a forwardly positioned locking knob for rotation of said rod about its axis, said locking rod, engaged with the locking screw, such that rotation of said locking knob rotates said locking screw to selectively engage said clamp plate in said clamped position.
11. A desk assembly as recited in claim 10, where said locking rod is rotatably supported by a bracket secured to and extending from an underside of said desk.
12. A desk assembly as recited in claim 5 where said carrier plate includes wheel arrangements rotatably mounted thereto, which engage in an outer surface of the column.

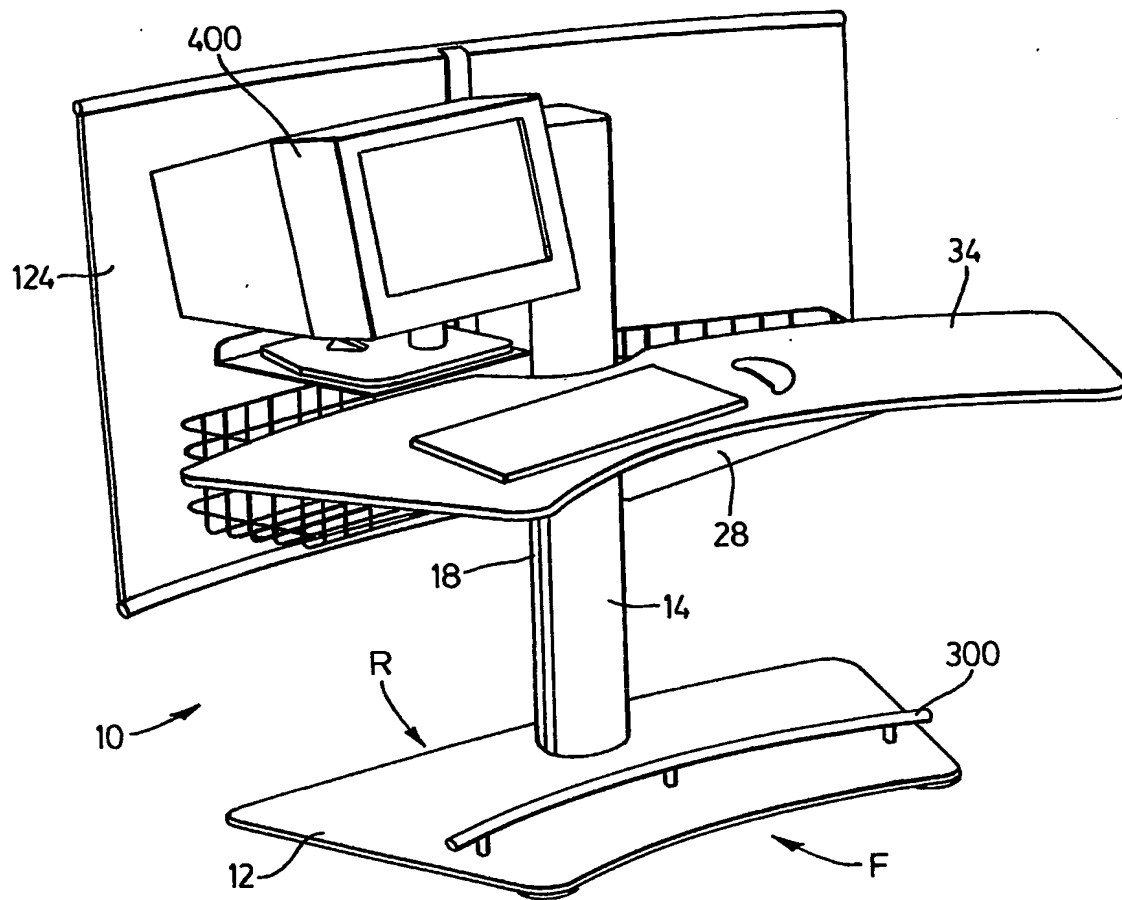
13. A desk assembly as recited in claim 11 wherein forwardly opening vertically extending channels are integrally formed with the vertical wall of the column on each side of the carrier plate, each adapted for accepting one of said wheel arrangements in rolling engagement therewith.

14. A desk assembly as recited in claim 6 wherein each said bracket includes an outwardly extending horizontal flange upon which the desk may be attached.



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**FIG. 1**

FIG. 2

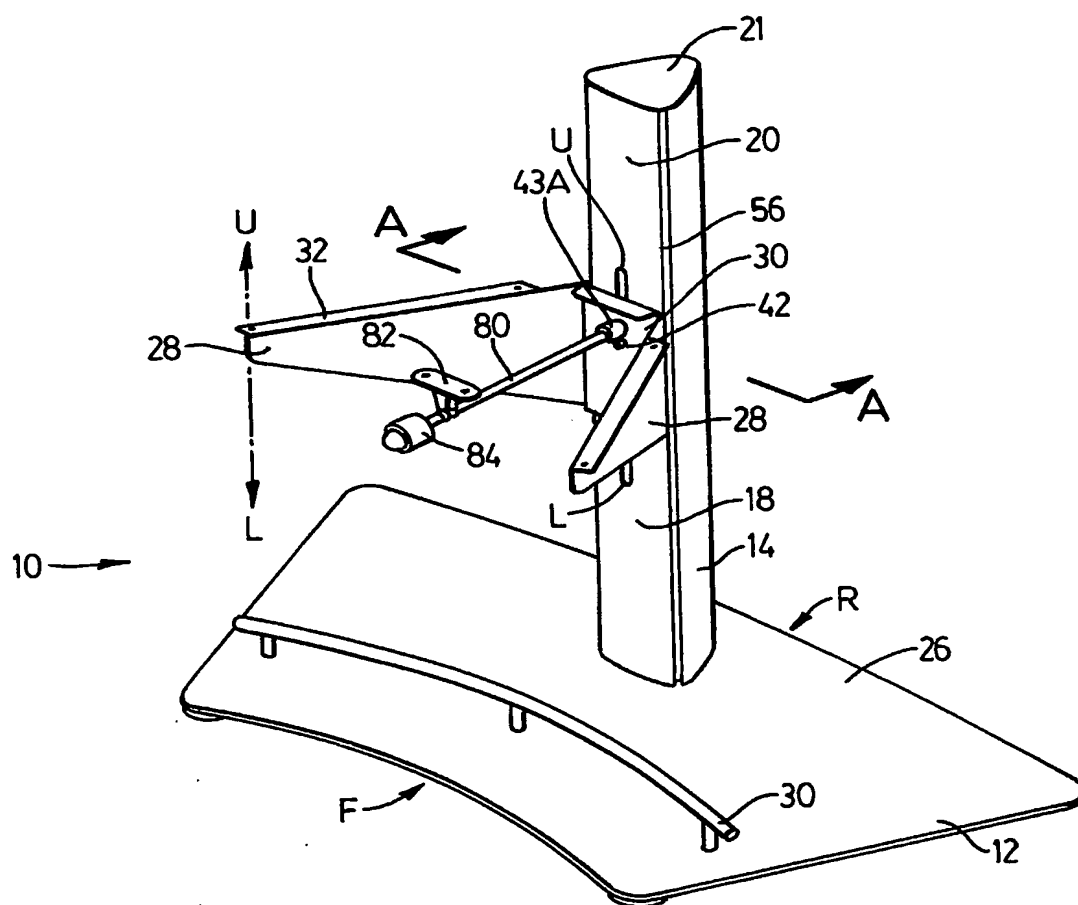
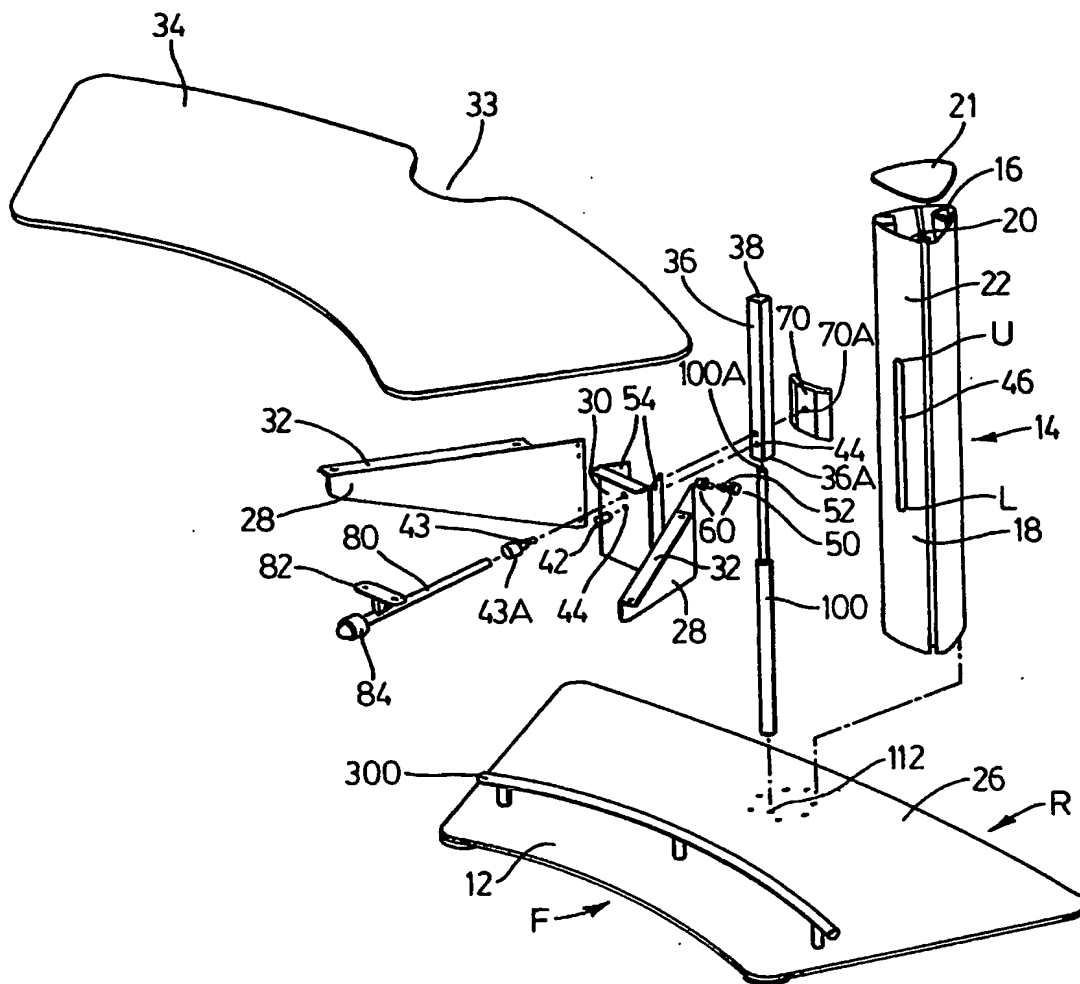


FIG. 3

**FIG. 4**

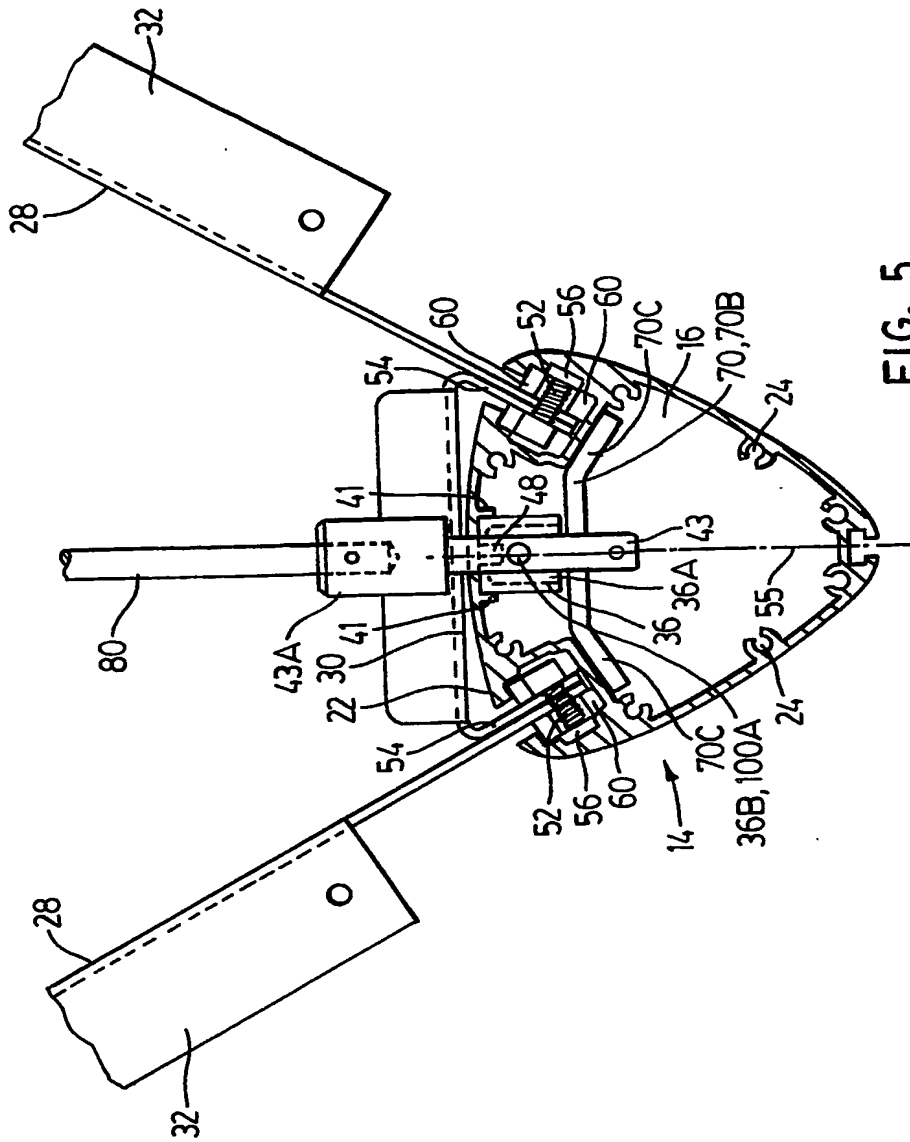


FIG. 5

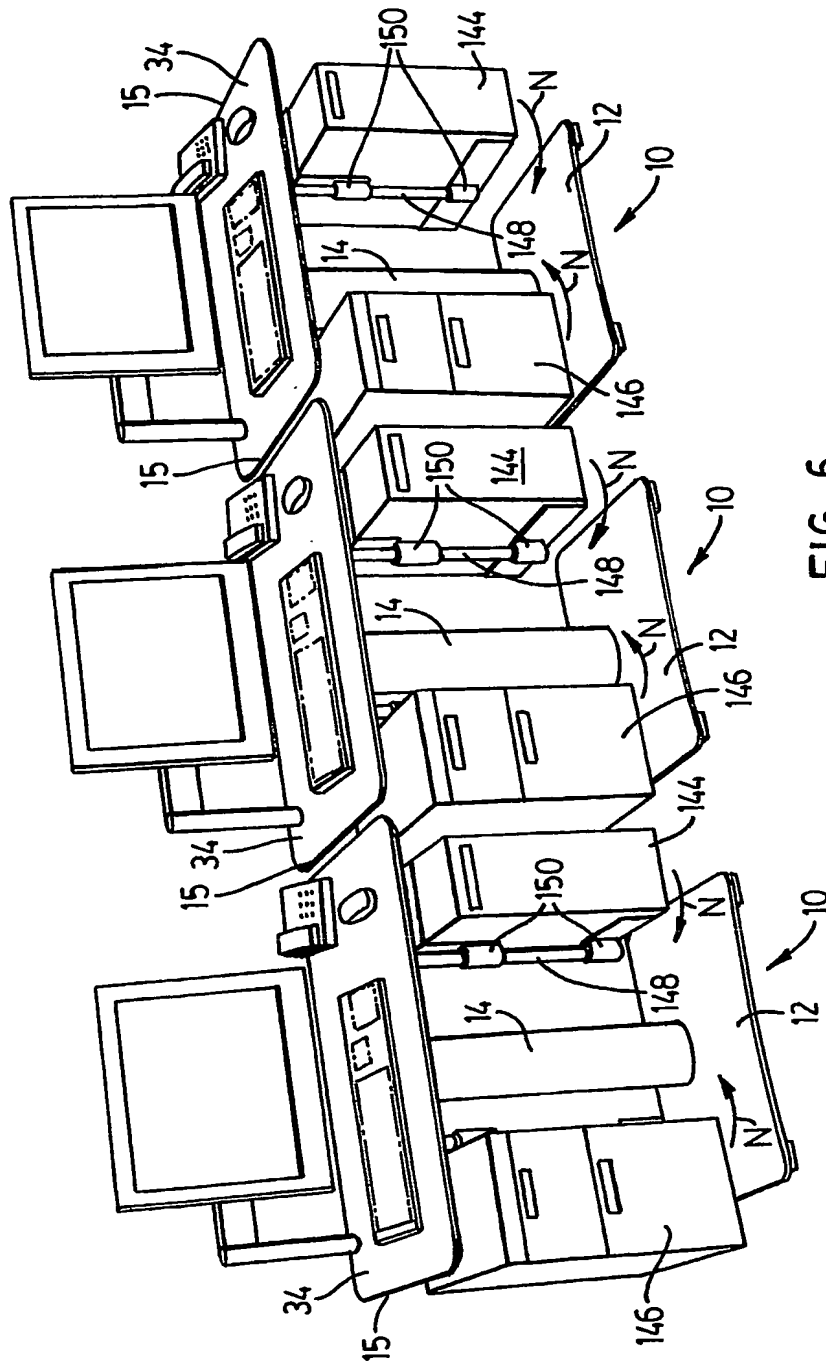


FIG. 6

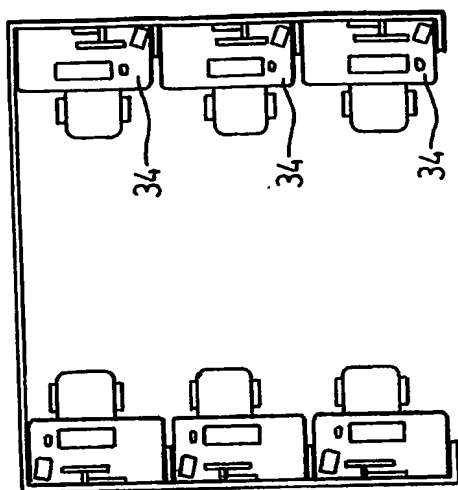


FIG. 7B

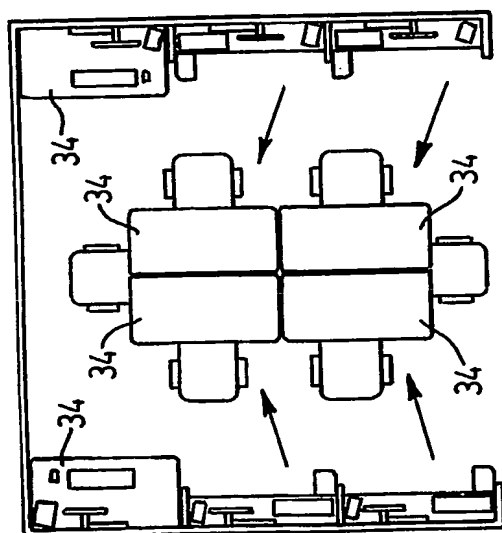


FIG. 7A

## INTERNATIONAL SEARCH REPORT

International Application No

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A47B41/02 A47B21/02 A47B17/00 A47B13/02 A47B9/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	-----	
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Patent family members are listed in annex.

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Date of the actual completion of the international search

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/03/01527

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